

[00:00:00] Welcome back to the podcast. This is Dr. Mike J. Nelson, and on the Flex That podcast here, we talk about all things to increase muscle performance, improve body composition, and do all of it without destroying your health in the process. Today on the podcast, we have back once again, the great Dr. David Church, and we are talking all about things that are anabolic, from exercise to protein to essential amino acids.

[00:00:32] And much more some great work he's done. So I wanted to have him back on the podcast to talk about, some older stuff, some good principles and some of the newer studies that he's been doing in the lab. Also we have a sponsor, which is Tech Time. So if you like exogenous ketones, it tastes pretty good.

[00:00:51] Check them out. Go to the link below, use the code Dr. Mike and save some money. I am a scientific advisor to them and an ambassador, so full disclosure on that. We are on our way through Texas and then down to South Padre Island as of this recording, and I packed my two cases of Tekton. Since I like it kiteboarding, I find it works really well, something that's a non stimulant based, especially for kind of that cognitive fatigue you get with I'm out riding for, sometimes two or three hours.

[00:01:26] At some point, your brain is just fried from trying to do everything. Maybe you're playing a sport. I think the cognitive fatigue was something, there's some pretty good data, although it's mixed, that ketones can definitely help. And that's one thing I've definitely noticed on that. So bringing a bunch of that down there with me.

[00:01:45] So check them out below. And without further ado, here is all things anabolic with Dr. David Church.

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[00:01:55] **Dr David Church:** The problem when you're chasing. Just absolute weight over your head or like on a squat is that, mass pushes mass. So you just it's not always maybe not always the best goal.

[00:02:06] Maybe somewhere in the middle would be a bit better, but I finally got there after, 18 years, 15 years of training and finding an appropriate balance.

[00:02:14] **Dr Mike T Nelson:** But I think it's hard because even now, like probably this is the most hypertrophy work I've ever done, which is saying that maybe only 20 percent of my program is actually Geared to all out hypertrophy because it just if I had to train that way for the rest of my life I would still do it because it was that was the option of you have to train that way You can't train.

[00:02:37] Of course, I'm gonna do that, but It'd be so weird not to care about the performance of it. Even with clients for hypertrophy, I'm still like, Okay, let's see, do we have progressive overload over time? Yeah, we may do some technique stuff, etc. But, I just think unless you're super advanced, you just get lost in the minutia of just trying to torture yourself.

[00:03:00] And it's 6 to, 12 weeks before you even know if you made any progress.

[00:03:05] **Dr David Church:** Yeah,

[00:03:06] **Dr Mike T Nelson:** I'm yeah,

[00:03:06] **Dr David Church:** I could go in every day and max out and be happy, like I just, I know I can't, right for the audience, I'm 35. So those days are you can appreciate where I'm at that you old bastard.

[00:03:17] **Dr Mike T Nelson:** For the community. Yeah, for sure. Oh, yeah. If you're talking like Olympic lifting, like highly competitive people, that's definitely on the older side for sure. Yeah. But I would go in there and Yeah,

[00:03:27] **Dr David Church:** I loved maxing out every week, like clean and jerk, man. It was like, ah, yeah, look, I got 20 more pounds on the bar this time.

[00:03:32] Or that was probably a weird week, but yeah I just loved it. I, or squat, but I had to get smarter, and. Five by five or something. That was my hypertrophy work. Not that, all that with the caveat of if you lift, you're going to grow muscle. I think we all agree.

[00:03:46] Oh yeah. Yeah. But I get that like targeted. Style of training it's yeah, I just I look like, I like i'd mix up like farmer's carries and stuff like that but like kind of that was always what I liked was the performance aspect But I certainly think now i'm a little older An appreciation for, well, my joints can't handle that as well as they used to be able to or maybe, maybe add some traction on the spine instead of compressing it every day, so anyway.

[00:04:12] **Dr Mike T Nelson:** Yeah. It's funny you mentioned that because I've looked at back at my program for clients, even myself, or I think I probably started this maybe three years ago of if they're doing a heavier squatting and heavy for them is relative, right? Or maybe even a heavy deadlift, especially squats or overhead pressing.

[00:04:30] Like lately I've been, last couple of years, I've been pairing it with hanging ab raises or chin ups or pull ups or something. And I've just noticed that anecdotally the recovery in their HRV seems to be better than if they just did that axial compression. And I know you're probably not decompressing the spine or all these things are going on, but I don't know.

[00:04:52] I think they're if I were to guess I think there's something positive going on by doing that

[00:04:59] **Dr David Church:** Yeah, I fell into it on accident. I don't know we've talked many a time I don't know if i've mentioned on the podcast before but I I like really hurt my back my like senior year of undergrad Oh, okay.

[00:05:10] Yeah. Yeah. I had a I herniate, classic herniated the disc I had the mri and all the proof right and I herniated it and Like degenerative disc disease, that whole, the whole nine yards and like immediately was like, stop lifting because this was like 2012, a little different time, right?

[00:05:27] Stop lifting and it just got worse and worse. And finally, I like you're saying, I was like, if I, if it's going to hurt, I'm just going to live. So I couldn't help it. And I started doing more deadlifts, not as much squats for a reason. I just started doing, I think I think, I I crossed over with Grant Tinsley at Baylor and he was doing the deadlift.

[00:05:44] So I think I would just like work in with him. Maybe it's how it happened, but like suddenly, surely back started feeling better and I've never had a problem with it since. I'm not saying it was the deadlift.

[00:05:54] Maybe

[00:05:55] **Dr David Church:** the deadlifts helped. And then I started getting more, some mobility work and probably, now I do a lot more, added some yoga and, trying to actually do, you've talked about in the past, producing force that like longer ranges of motion, get that mo, when that mobility piece, I always think of, I always think of like range of motion and force combined as mobility.

[00:06:15] And it's all. Really helped. And then it was interesting that we're talking about, I think it was like my, my, my last year, my dissertation or something like that. I remember listening to a podcast Matt winning, I believe was on it. Yeah. Very, one of the great longevity for a power lifter, he's still very, at my age, he's and as I think maybe even older, I don't know, he was talking about this very same concept of mixing in, like if he was going to do.

[00:06:39] A bench press, you go do, a hundred reps to really light pulldowns, always adding in the traction and the compression piece together. And I was like, that makes sense. I fell into it on accident, but clearly there are people very smart out here that have sorted

[00:06:52] **Dr Mike T Nelson:** it out. Yeah, and even then, it's what is, I always think, what's the negative of it?

[00:06:56] So, they got more work in a chin up and pull up, like, how is that ever really gonna be bad? No one's ever fried themselves from doing too much, unless you go completely bonkers and get joint pain and stuff like that, but And I think as we get older, we're a lot better

[00:07:10] **Dr David Church:** guarding against that, at least nowadays, I make the joke with Dr.

[00:07:15] Fernando's next door and, he's a little farther longer than me in the aging spectrum, but the joke is you get to a certain point. All your workouts are warmups and rehab sessions, if it's getting to be that way. I notice I'm doing a lot more rehab and prehab and just making sure things feel good.

[00:07:31] And I still try to get a good number of working sets in, but yeah, certainly it's, there's a lot more time spent on a bike. That doesn't feel quite right today. Let's play the long game here and survive another day. Anyway.

[00:07:43] **Dr Mike T Nelson:** Yeah. I had that the other day cause I had to push up my lower body session at the gym.

[00:07:47] So usually I do it Saturdays if I'm not traveling. So I had to do it yesterday, which would be Wednesday. And I knew it wasn't going to be like. The greatest but I had four days off coming up So i'm like whatever if either do something or not do anything like something's gonna be better than nothing And even doing hack squats like my right knee I could start feeling it was like a little bit Funky couldn't quite got it better in the mention.

[00:08:08] I'm just like I'm just not doing my two top end sets, I'm not gonna I'm not gonna hit my performance metric. I wanted to hit the only thing that's gonna happen is i'm just gonna aggravate it and piss It off more if I stop now, it'll probably be just fine tomorrow woke up this morning forgot all about it Like never happened, but man if that was even like 10 years ago, i'd be like god, this is stupid.

[00:08:31] I got this and then You're pissed off because your knee hurts for four months after it. And you're like, I'm so stupid. I know you're exactly

[00:08:39] right.

[00:08:40] **Dr David Church:** I I like came back out of big travel schedule there in June and July where we interfaced there at June. I got back from all that and I was doing my best on the road to keep up with their thing.

[00:08:50] You can, I know you can appreciate it. It's not hard per se, but there are some times where it's just like today is packed. I got meetings all day. I messed up because I didn't wake up early and I just, I'm not going to get it in, so I've learned that Hey, on the road, I got it. I got to wake up early and get it in the morning.

[00:09:06] Otherwise it doesn't happen. But I had a few of those days where I didn't. And I get back from the flight, you're stuck in there and I did like just a 20 minute jog, man, just jog. I didn't even try to go hard. I just, just try to get the kinks out all that stuff. All those verbs that we want to say, man, my, my left.

[00:09:26] So as has been like, bothering me since then. Yeah, it's gotten better, but it's it's just my point is like, how long that stuff can stick around. If you try to fight, that was the point I was making was like, how long that stuff will stick around if you try to fight through some of those warning signs on your sets nowadays.

[00:09:43] Now, and that 20 minute jog, there was no warning sign. It all felt good. I just woke up the next day and went,

[00:09:49] **Dr Mike T Nelson:** shit, that hurts. Yeah. Well, that even with just new movement patterns, if you haven't done something for a while. Like you can feel pretty good. Like the worst injury I ever had, I've had a lot of injuries, but it was, I feel like we're like a bunch of old codgers talking about how beat up we are, but it was I was doing deadlifts and went pretty good.

[00:10:08] It was like, yeah, okay. I had a whole bunch of movement issues at the time. This is. God, back by 2003, I think, and for some stupid reason, I got it in my head at the end of my session that I should do sprints on a treadmill and I should do them at a really high incline, which I had never done. I was doing overland sprinting, I don't know why it wasn't in the program that the coach I had wasn't his fault.

[00:10:32] It was my own doing, get on the treadmill, started doing, Oh, this feels pretty good. Yeah, it feels a little weird. Eh, stop. Oh, whatever. Go home. Like literally like by the time I got home, it's only like 15 minutes away. Oh, something doesn't feel right. And they're like, ah, I'm just, it's muscle soreness already.

[00:10:48] Even though, that doesn't make any damn sense. And didn't think too much about it. Go to bed, wake up at three in the morning going, Oh my God, what the, I could not roll over, I could not move. Long story short, I ended up pulling both my hip flexors and my adductors. So, so nervous. I ended up going to the doctor like four days later and he's basically yeah, he didn't rip them off the bone.

[00:11:15] So it isn't really anything we do unless if you ripped them completely off the insertion, you'd have a lot more bruising and we'd just maybe stick you in the cast, but there's nothing we can do right now. And so I had to walk around like a Geriatric penguins that pull up his ass for four, four months.

[00:11:34] It was a horrible. Cause you forget like how rolling over in the middle of the night, you're using those muscles to reorientate your pelvis. So I had to do this trick where I'd wake up screaming and grab the sheet underneath and hold onto it and just pull it really hard to get myself to.

[00:11:52] **Dr David Church:** Yeah that's terrible.

[00:11:53] In your right sleeping stuff when you like I've thrown my back out now. Oh, yeah, that's bad I got one under my belt now Yeah, talking about war stories and it's I'm used to make fun of people for it But now that I've done it like it is it's weird. It's like you can't stand up straight that first day Don't for anyone that does it by the way.

[00:12:12] My recommendation is IV. I'm not a doctor. Not a real one But what I mean ibuprofen and I go get in the pool immediately Yeah, I'm talking to PT's and I have a lot of friends that are PT's You haven't really hurt the back, right? It's just those muscles have tightened up because they're trying to protect you.

[00:12:31] And so the PT was telling me what you actually need to do is you need to try to encourage movement. And when I get in the pool, all that I can just get into, it helps encourage the movement because my core gets supported. So my abs don't have to work as hard, which means my back relaxes, which now I can get into a deep squat in a pool and everything.

[00:12:49] And that speeds up the process by like. Within the week, I'm, at least that time, within the week, I was fine, whereas I think the first time I did it, it was bad, but All the war stories aside, to be fair, that how I feel now is to, to go back to your point about where like old dogs like, hurt, like this is the best I've probably felt since I was 25.

[00:13:08] So yeah, same here. Yeah. Yeah. And it's, by the way it's this basic principles of what you're talking about, of oh, let's back off today. Let's fight another day. And being smart about training of, like you're saying, putting in the hangs when you're deadlifting, excuse me, or putting the hangs in when you're squatting.

[00:13:23] And just being smart with program design. And then if I get a cute idea, cause I borrowed something from the last time we talked, he said, build in a challenge or something. I think you did, you had a big bar deadlift that you're carrying to the end of the driveway and back. And so I tried to, I've tried to start, I was like, that's a good idea.

[00:13:40] And so I've tried to build it in my training, but building it in an intelligent way. Cause the first time I did it, I was like, Oh, let's do 400 meter repeats. Oh yeah, it was, I love them by the way. It turns out I really like it because it gets it done quickly and efficiency is so important in my life right now.

[00:13:56] But I was smoked for about a week afterwards, so just being smart, and I feel great, compared to when I was, in the middle of my PhD and maybe in the beginning of my postdoc and stuff like that. So, like a 26 The 32, there's obviously that been flows, but consistently this past year and a half.

[00:14:11] So that's, I felt probably something like 25.

[00:14:13] **Dr Mike T Nelson:** Yeah. And let's side note on the pool. So I talked to Ron Haraska PRI years ago about this, that they had a whole pool rehab thing built out. And the other part too, is not only do you get movement, you get deloading, maybe you get some compression and then you also get a

massive amount of proprioceptive feedback because you've got the water moving over your skin.

[00:14:34] For people who don't have maybe the best movement in air, you put them in water, like their movement cleans up a lot because they have that heavy resistance, that feedback against everything too. So, yeah, that's really, it's almost if you. Someone's struggling with squat and you have you hook a band to their back and then you let it sit back.

[00:14:53] **Dr David Church:** Yeah. Yeah. Yeah. Good point. That's excellent.

[00:14:56] Yeah,

[00:14:57] **Dr David Church:** well, that for anyone that throws their back out, man, ibuprofen into my wife. In fact, the second time it happened is if we figured out it like the first time it happened, it lingered for two or three weeks. And they're like, we went on vacation and we were worried, but we know we're on vacation.

[00:15:12] And there's one man, but like the second day I was like, I feel great. And so the second time I threw my back out, she's yeah, get in the pool. Like she's go, I need help. I have things I need to do. I can't, so it it made a big difference. I want to say like within, I was able to walk the next day, so to speak, versus.

[00:15:29] I was a little ginger on it, and then I want to say by the second or third day, it was like, I was already back to training, just smartly. Yeah. Yeah, I think it's great. Anyway.

[00:15:38] **Dr Mike T Nelson:** Yeah, and it's ironic that doing a PhD in exercise phys or any area of discipline like that is probably the worst thing you can possibly do for your health.

[00:15:48] I was the most destroyed health wise at the end of that than I ever was. It took me almost like three years to get back to normal. And I finished my PhD when I was 38, and it took 7 years. But, you know you're screwed when your day starts off of testing people in the lab. You gotta get there at 4.

[00:16:06] 30 in the morning and turn on the frickin metabolic cards to calibrate them and do all that shit. And then You're taking a caffeine power nap in the back of your used vehicle at 930 in the morning. Yeah. Yeah. Yeah.

[00:16:19] **Dr David Church:** We call those a nappuccinos. Yeah. Yeah. Yep. Yeah. Slam the espresso. Go to sleep. Wake up feeling great.

[00:16:26] Yeah. No, it was. Yeah, it was. It was. I, in my master's, I was I was an intern for the athletic performance department, working with the athletes and then taught racquetball and weightlifting, I made sure they didn't kill themselves and I've lived alongside them and play racquetball with them.

[00:16:43] Right? And I'm walking everywhere on campus and I'm doing some research. I was, that was probably the best shape I ever got into was at the end of my master's and I held on to it pretty well for about three years. First eight months of my PhD I hurt my knee just oh no And then like literally like the next week I hurt my shoulder.

[00:17:03] So then i'm like trying to Opposite end so i'm trying oh shit. You're like And it just went downhill from there and I want to agree with you. I want to say it My postdoc was pretty my postdoc was interesting. It's a little different. We still had, I still had plenty of early mornings with the infusion isotope book we do.

[00:17:20] And I did them, we, I traveled a lot for it, but in a way it was, there's a little bit more structure to it. It's you knew yeah. So I was able to get some of it back, but I would agree That's exactly what I was trying to say. It was like, basically this is the best I've felt since the beginning of the PhD and it's taken, I've had a couple of kids in there too and everything.

[00:17:40] So, yeah, but I would agree. It probably, if I, without the kids and all that, it probably would have taken a solid two or three years to just get back to where you not only feel it, like step one is maybe you agree. It was like, you started feeling better with how you move. Yes. Oh, definitely.

[00:17:55] Yeah. And that might be like weight related, but then the clarity of thought and then just feeling a little bit better, like for lack of a better term metabolically, but what I meant, what I mean by that is following eating food, just not feeling as

[00:18:08] **Dr Mike T Nelson:** crappy as I used to. Yup. Like more consistent energy, higher levels of energy can do more tasks, even cognitive tasks.

[00:18:15] Yeah, exactly. Yeah.

[00:18:16] **Dr David Church:** A hundred percent. So that, that all, yeah, that took a lot longer than you would think. We always joked, it'd be really interesting. A study ironically to measure exercise physiologic PhD students and by the way, it's probably the same across most disciplines. It's just either in theory if you're doing a PhD in some sort of exercise discipline. You're probably coming in higher at a higher baseline value than most people start their PhD. So the drop off is just so dramatic, but it would be we always joke that we should have tested ourselves like pre and post this this four year, grind for lack of a better term, but then I think you know I think someone had a pretty reasonable they, they did a study, they did, they were one of the participants in the study when they first got there.

[00:18:57] And they're they did, I think they did a train study and then someone had an untrained study at the end of their time, they're like, Oh, I started off doing a train. And then they're in the

[00:19:05] **Dr Mike T Nelson:** untrained group

[00:19:06] **Dr David Church:** at the end. Yeah. And but I think that's something like a loss of 200 Newton meters on just an isometric.

[00:19:11] Which, they started off at 500, it was like 500, 550, and then they had lost like 200. So, looking at like almost a 40 percent loss in just force producing capability or a year prison, it wasn't like they weren't lifting. It just, it's not consistent. Yeah. Anyway. Yeah. No, it just goes

[00:19:29] **Dr Mike T Nelson:** to.

[00:19:30] Just the overall stress is such a bugger. I was doing everything I can to still lift. I had started accumulating stuff in my garage. I had stuck kettlebells under my desk at the University of Minnesota. I had access to their gym down there. I was still working for a med tech company for most of it.

[00:19:45] So I had access to their gym. I had a punch pass at another gym that was closer to the university. I literally had six places I could lift at any one point, just because you literally had no time to go to the gym. And people are like, Oh, but you had a gym in your garage. I'm like, yeah. Yeah, when I was home in my house, like sometimes I slept in the fricking lab at night and showed up and shirt out in the morning,

[00:20:09] **Dr David Church:** and we had a locker room too.

[00:20:11] So yeah, we would like yes. Yeah, I sleep and I there are many times I'd sleep on the decks of table Which is not comfy. No, for four hours, radiation beam right over you. And then go in the locker, take a shower, change into like clothes that look somewhat reasonable for the participants that like, whatever.

[00:20:29] So yeah, it was, I always try to tell people when they want to do a PhD, I actually try to discourage them first. And if they like three or four months later, they still want to do it. I'm like, all right. Yeah. We're closer, I still discourage them, but there seems like you might have the right, I don't want to say the right stuff, but because there's a lot of different types of PhD programs.

[00:20:47] Now, I think, oh, yeah even from when I graduated it's a much different I think there's a better appreciation for the mental health side of things than even when I, and I'm not that far out, I'm like six years out. So, Yeah,

[00:21:03] **Dr Mike T Nelson:** and I think it's different with any degree that has a high amount of lab work because if you're doing asynchronous work, it's still hard.

[00:21:10] I'm not, diminishing it or saying that there's anything different, but if you're doing anything where you have to work with live human subjects, you've got all the constraints that go with that. You've got, mechanical machines, you've got to get cows. You can only get them in usually most of the time in the morning.

[00:21:26] You can only, crunch some of the data. You only have access to what you need. Some of the time you have to be on campus. Like for me, the greatest thing ever was when I was finally just ABD. I did my four and a half years in the lab. I stopped taking money. I'm like. I have all my credits done. All I have to do is just write this thing and then it still sucked, but Oh my God, it was so much better.

[00:21:48] **Dr David Church:** Yeah, the last semester of my PhD was like amazing. Cause I, I had all my data collected for my dissertation. I was just in writing mode. I had a job locked up. I didn't, I showed up. I was, I think I left in the middle, me and my buddy was in the same shoes. We didn't come into like noon one day, which is like, Oh, let's go get breakfast.

[00:22:10] And we walked around town, cause we're in Orlando. And I guess we should go in and we took care of a couple of tasks. We lifted at three, we were home, bye guy. It was it was amazing. But first three and a half years were. We're a slog to get there for sure.

[00:22:25] Anyway, enough war stories.

[00:22:27] **Dr Mike T Nelson:** And that was the thing once I was done was that my two goals for my business was not set an alarm on Monday morning and be able to lift between one and two in the afternoon. So I built my whole business around those two things, which is amazing. I

[00:22:44] **Dr David Church:** always said I've failed you.

[00:22:48] I have always said that I want to work out at 10 o'clock. Okay.

[00:22:52] **Dr Mike T Nelson:** Yeah. Everyone usually has their perfect time. They like, if they've done it long enough, you figure out what your time is. You like

[00:22:58] **Dr David Church:** mine. I found that from teaching that hour at Baylor and I liked it. Cause it was like, I could do, I worked out a little longer than, if you get a solid hour and a half workout, you're at 11 30.

[00:23:08] Hit a shake or whatnot. And then, lunch, right? And you can get into the back end of your day because I like the front end of the day. I think that's right there in the morning. I like to get some of those those types of tasks, those types of things taken care of there.

[00:23:21] And but then you can go work out. You probably do something to work out and I can think about a problem I had or, that I didn't, that I couldn't solve in the morning or one that I know I have coming up and it helps break up the day. But as it is now it's wake up, get the kids to school and then go work out and then come in the lab.

[00:23:39] So, yeah. We've find a way where I'll get there one day, but for now, this is this is what it is. And some, and when you have kids to sometimes it's and you got a lab, sometimes it's oh, man, today's a busy day. I got to get in. Drop the kids off straight in, come home, they go to bed, but then, unfortunate like you, I got some weights in the garage and the key here is.

[00:23:59] I can't get the same workout I was going to get in if I go to my, if I go to the gym, but I'm getting something in 20 or 30 minutes circuit. And it's amazing, and there's sometimes I can just do it with body weight. I don't even do, I don't even do the weights, but it's amazing just by doing like a 20, 30 minutes circuits, like sprint to the street, walk back.

[00:24:16] Do some air squats and jump rope, some sort of like that. It's amazing that's just really, that really helps you stay in the groove and just maintain everything that we're talking about. Yeah. I guess you just find ways to work around it. One thing

[00:24:29] you mentioned

[00:24:31] **Dr Mike T Nelson:** the like I told people.

[00:24:33] You don't even need a rack, get some three quarter inch farmstall mat, get a nice bar, buy used weights, as long as they match on both sides, who cares if they're a couple pounds off, like the left and right end of the bar will match, that's all that matters, and then you could do deadlift, overhead press, you could do floor press you don't even need a rack, having a rack is great, you could get a couple kettlebells, so there's always, if you have space, there's ways you can do stuff.

[00:24:57] And like you said, even doing a couple chin ups and a 5x5 deadlift for 20 minutes that's pretty damn good.

[00:25:03] **Dr David Church:** Yeah, and I'm with you, I actually leave the bar in the, I have a rack, I leave the bar on the ground. I'm more likely to use it. You know what I mean? It's, I, and I have a couple kettlebells, and they're not heavy.

[00:25:12] And I'm not here to talk about anyone's maxes or anything like that, but I promise you the amount of weight I have in my garage is nowhere near my 1RM, that's not why I have the weights in the garage. The weights in the garage are the kind of, at the moment, in the stage of life I'm in, they're the band aid for Okay, I didn't get into my normal time, and I didn't wake up early enough to go in at 5, because there are some days where I'm on it.

[00:25:32] And I know that it's going to be a busy day at I sit down the night before and I'm like, okay, that's busy. I got to wake up. I got to wake up at 4 30 to get right there when the gym opens and I can get it in from 5 to 6, get home, get the kids to school and get straight into work. But on the days where that doesn't happen and a long day at work or say, work goes long and it just couldn't get it done.

[00:25:50] That's when just having something in the garage that. A couple kettlebells, got a jump rope using my own garage stairs and it's just some weights and a bar and it really goes a long way, really a long way.

[00:26:04] **Dr Mike T Nelson:** And that goes back to the discussion we had even at ISSN two years ago about, and I think you'd probably still agree that if you were to pick one thing and obviously we'll talk about nutrition and some super cool studies and everything you guys got going on in your lab.

[00:26:18] I still think if you get the stimulus portion of the equation close to right, you I just still believe that is probably, and again, if you had to pick one thing, no, people have realized you don't need to pick one thing all the time. I just think that is THE thing, and everything else is supportive of that thing.

[00:26:36] Yeah

[00:26:37] **Dr David Church:** I would take a bad eating day as long as I trained over a good eating day if I didn't train, I think. Yes.

[00:26:43] **Dr Mike T Nelson:** Yeah, if you're looking at the long term chronic results of some performance trying to keep some muscle not degrading into an amoeba type thing.

[00:26:54] **Dr David Church:** Right, and that was the whole point of that diatribe of I got these various ways, these very, I realized that I got to do it in the morning.

[00:27:00] And if I have a busy day at work, I know I got, that means I got to set that alarm. Unlike you see, I failed in two ways. I set that alarm and I get up and I go and I get it from five to six. But by the way, it stinks. I'm an early riser too. I generally don't have a problem with. Picking up at 4 35 o'clock.

[00:27:18] I just, I like it. And now I go to bed early, but I don't have a bride. It doesn't bother me. And it is a little bit, I do feel a little sluggish on those days, but as soon as I get in there and I get working out and I get another workout, it's a, it's resolved. But then, like I said, normally on a most normal days, I can drop the kids off and then go get a good solid hour workout and then get in here at nine and it's no big deal.

[00:27:43] But, again, when that all doesn't happen, I got, that's why I have the stuff in the garage because it's then you don't have to, you can keep your nutrition. You don't have to manage your nutrition. It's I got to work and I got a stimulus and I can keep my habit, my system. I'm working.

[00:27:58] That's all different layers that I've used to make sure I get exactly what you're talking about. I'm getting the stimulus because as long as I get some

sort of exercise in, I don't, I know I have room to play in my nutrition and I'm not like for anyone listening. I'm not like a competitive bodybuilder and I'm not going to get into I'm not someone that's gonna get on stage and then you probably not going to pick me out on the beach either.

[00:28:21] But, in terms of not feeling like. Like that and then just feeling good and operating just

[00:28:26] **Dr Mike T Nelson:** feeling feeling like you're a good functioning human. Exactly.

[00:28:29] Yeah.

[00:28:30] **Dr David Church:** Yeah. Yeah, that's the having all these ways of making sure I get the training in. Trumps some sometimes, I worry more about that than the nutrition.

[00:28:39] I have some tricks with nutrition. Like we all do. Like I like to keep, some sort of high protein chocolate milk or, shake frozen in ice cubes in my freezer. And then, if I want ice cream, I can dump it in a blender and blend it up and I got a frosty. Things like that. That's cool.

[00:28:54] So you take

[00:28:55] **Dr Mike T Nelson:** protein, you mix it up and then you make ice cubes out of it. Is that right? So you just throw in the blender then?

[00:28:59] **Dr David Church:** Yeah, and I, insert name brand of high protein milk here tends to work probably better. Sure. . I actually, pull, I use the cheap stuff from Kroger, it's called Carbo Master, but I'm an assistant professor of the, with the lab.

[00:29:12] I don't have, it's not a. Not, I'm not on the name brand level, but it's the same macros, and it's pretty good. It's pretty good calories. I think you end up getting like the ice cubes I'm making, it ends up about two servings. So it ends up being about 20 grams of protein and 240 calories, and whatever, whatever that, the ultra filtered high protein chocolate milk is.

[00:29:33] And yeah, I've just freeze it in ice cubes and then I dump it in like a ninja blender. And I blend it up and it's the same thing as the Ninja Creamy, except it Blender can do more than one thing. Nice. And it's a lot cheaper than a Ninja. Creamy. Yeah. Yeah. And then I have a nice base and if I wanna add a

chocolate chip cookie in there, I got like a 400 calorie, flurry or a frosty type consistency with the chocolate chip cookie in there.

[00:29:57] Man. It's so I have a little, it's not all to your point, like it's not all one thing. But yeah, if I had to pick one of the, one of the two, I would, I'd be way more concerned about getting that exercise team and just feel better, I think of it as an oil change, but , we know for a fact, it turns over your proteins and it turns out, it just turns over all these things in the body and I just, every time if I'm feeling a little sluggish or a little down, I go do a workout.

[00:30:21] I just feel better afterwards. So yeah,

[00:30:23] **Dr Mike T Nelson:** long diatribe

[00:30:24] **Dr David Church:** to say yes, I agree.

[00:30:26] **Dr Mike T Nelson:** Yeah. And the cognitive benefits too, I think are underrated and obviously, as well as I do, there's more studies coming out now and weight training used to be all just hippocampal volume and aerobic training, which is still, super beneficial, but to me, it's always fascinating that it's like your body is just designed to move and when we exert high cognitive work, not moving, there's a cost that ironically has to be repaid with movement.

[00:30:56] Because you think like intrinsically, you think, Oh, I just need to rest more. And that's definitely helpful. Get your sleep, do all that stuff. Yes. That's great. If you can go meditate. Yes. Have down periods of time down, regulate a hundred percent. I've lost track of how many clients are just doing high cognitive work all day.

[00:31:12] Or we've said, just go to the gym and move do some bro work get on a rower, do some zone 2, just do anything. I guarantee you'll feel better. You don't want to do it at that point because you literally feel fatigued, but every time I've done that myself, I'm like, oh yeah, I definitely feel better.

[00:31:31] **Dr David Church:** I always tell people, research is me search, I think we were talking at ISSN this year, it was like, I would write, and I'm gonna say this publicly, right? Where it was like I think I told you, I was like, I just wasn't making a lot of progress and I feel like I was in a rut. And then I was just, it was a rough workout in the morning.

[00:31:47] And then the next day, for whatever reason, it was one of those days that I couldn't get it done in the morning, but I was able to, I was able to leave

work early and squeeze it in before I got home. And for whatever reason, I like really, I was really working out. I got a really hard workout and I got done.

[00:31:59] I was like, Oh, I need to work out at a higher intensity. By the way, I've been an exercise physiologist for years. Yeah. I've been training for 20. And then, so I was like, that's what I need to do. And I tried to do it the next morning and I was like, man, my legs are just not moving. And it was like at the end of the workout.

[00:32:16] And I was like, oh. I was able to work out hard that day because I was later in the day and I got like some food in me. Turns out I need to eat something too. So like in a week after being an exercise physiologist for many years, I was like, I need to work out harder and I need to eat before I work out.

[00:32:31] So I'm just pointing out the point there of you're saying like, every time you go and you do it, it's oh yeah, that's what I needed. No matter how educated we are. Sometimes we we maybe make it more complicated than it needs to be, but I agree, I think the stuff coming out on resistance training and maybe we could just say training in general and the importance it has for cognition is so cool and, it should make some inherent sense when you consider what is the nigrostriatal pathway in the brain is when the dopamine pathways in the brain and that's implicated in Parkinson's, which is a cognitive and motor.

[00:33:03] Both fine and gross motor deficits. So it should make some inherent sense. We still got to show. But the fact that this pathway, starts in the main brain and runs up to the forebrain and ends right on that M1 area, which is responsible for sending kind of the drive down to the muscle.

[00:33:21] That's not maybe the best term, but for layman's there. Yeah. Sending the drive down to the muscle. Cause we know, I feel like it's something Matt Stock does a lot with the transcranial magnetic stimulation. Oh

[00:33:30] yeah.

[00:33:31] **Dr David Church:** Ryan Gertz. Oh, okay. Yeah. They did some of that. And if you stimulate that in one area, which is where that pathway ends, you can actually improve force production.

[00:33:39] So it, it's really interesting, right? That these pathways are shared across cognitive certain domains of cognition. I think that's important to realize. Not all domains are in the same there's just pure, working memory. There's.

Executive function there's, the ability to task switch, there's just pure, reaction time, there's different domains, but it is interesting to see the.

[00:34:00] crossover of the different domains between training and improvement. We see in muscle and seeing brain health. It's really awesome.

[00:34:09] **Dr Mike T Nelson:** Yeah. And I always go back to thinking about Parkinson's. If you watch someone with Parkinson's move, it's normally the initiation of movement. That is the most difficult portion.

[00:34:22] And once they get moving, yes, their movement is still very choppy. It's not super smooth, but it's that dyskinesia that just getting, Movement going which I always think of is that related to like your substantia nigra at some point just get tired You just don't want to initiate any movement or your get to the gym.

[00:34:39] But once you get over that initial hurdle, like everything is fine. Then again, I don't know.

[00:34:45] **Dr David Church:** Yeah, I have, I am not admittedly not a Parkinson's expert. We are neither of my way out on a limb to be, well, to be blunt with you, it's an area. I'm certainly interested in trying to get into him.

[00:34:57] I know Marcus Bamman has done some really interesting work using resistance training and Parkinson's patients that they've seen that the resistance training results in, lower scores of the tremor, how they yeah They can clinically quantify the degree of their tremor or the degree of their symptom symptomology and that the resistance training actually helps reduce Those symptoms or at least attenuate the rise in it.

[00:35:21] So it's really you know, I mean we know right I mean you and I know most people probably listening, exercise works and we're not surprised But it's just nice and it's really cool to see it work in a lot of different pains a lot of different populations. Yeah. So yeah, really cool stuff.

[00:35:37] I find that I, let's see, I, sorry. I like, yeah I just find that I feel like I'm more efficient during the day and I feel like my higher quality work and, and maybe I'm wrong, maybe I'm delusional. There's certainly a possibility, but yeah, I just find, but man, it just, everything seems to be better.

[00:35:57] At work when I get the stuff done. Oh, yeah. Yeah. And like you said, I like that cognitive sort of break in the afternoon. So if I can do deeper

work, like writing newsletters, if I've got to write up studies or abstracts or whatever. Ideally book writing if I can do that in the morning and then I have a break with some movement stuff and then do The email the client follow ups other kind of more task stuff and when i'm forced to take time off I realize i'm like, oh my gosh, like i'm just not nearly as effective the later half Like it's just a lot slower.

[00:36:30] **Dr Mike T Nelson:** It's a lot harder, even though in theory I have more times. I didn't spend that hour or two hours or whatever training. But it's just such a huge investment that I think you get paid back for that. It's when you don't have the habit, it's hard to convince people of that to start.

[00:36:49] **Dr David Church:** Yeah. And that's where I always encourage, and I'm sure you're along the same.

[00:36:53] The problem is I think you and I agree too often.

[00:36:55] **Dr Mike T Nelson:** Yeah, that's something we disagree on.

[00:36:58] **Dr David Church:** Yeah. Yeah. Well, I get called out on I always say I like it when I disagree with people and Dr. Katie, her, she was back here. She, yeah, she's always that's good to your personality.

[00:37:09] I'm like, wait, what should we do? She got me onto the Enneagram, which is type of personality. Oh yeah. And I'm a, I'm an eight. Okay. Yep. Yep. Yeah. So she always likes to say it's cause it's my personality. She keeps me honest, but I just find it interesting when you find a topic you disagree on, you tend to learn something, so yeah, that's where I always find when we're talking about habits, I always try to tell people like, think about your system. That was what I was talking about earlier on that. I wasn't bragging. I was saying I've had to build this system of I got to check the night before I go.

[00:37:36] Totally. Because everybody has to. Yeah. I'm going to forget. I wake up. I can't, I'm a human, not always good. And I'll wake up, if I don't check the night before, I'm like, what am I doing today? I'll be sitting there, and I'll look at my scope, and I'll be like, oh, I totally forgot about all that.

[00:37:52] So, I had all my stuff packed. Well, I can't go to the gym right away. Now I'm going to be trying to rush all day, to get to the gym before I get home. But anyway, so the point is that I've had to build the system of look the night before. Okay. That's a busy day. I gotta set the alarm for 4 30 to get up at five to get it in.

[00:38:11] Cause if I don't, I'm going to be grumpy. I'm just not going to be operating at the level I want to operate at, and I'm just not going to have as a beneficent of a day, or I can go, Oh, I got no nothing. I can get in at my normal time. I dropped the kids off and I can go, I got all my stuff packed, all that's ready to go.

[00:38:30] My gym bag. I don't have to think about any of that in the morning. The only thing I do is turn on the coffee maker, get the coffee, get the kids ready, which is important. And I go right to the, there's nothing I got to worry about for me. That's taken care of lunch is made, blah, blah, blah. Or again, where it's eh, morning shot, whole day's busy.

[00:38:46] I'm gonna have to do it in the garage tonight. And that, that, that's the system I've built. That's just helped keep the habit. So I always think about how can I build a system to enforce the habits? Same thing with the ice cube tray and the ultra filter milk, but it's always in there. So if I'm, cause I like chocolate and I like sweets, it's like, what system can I build to maintain my habit?

[00:39:06] That's just what I'm doing now. There's other ways. Yeah. I always think of a system that you can have.

[00:39:12] **Dr Mike T Nelson:** And I'm sure he comes down to that. Even like with high level athletes, it's crazy how you do some consulting and you realize that they're extremely systematized for some things. And you ask them like, Hey, bro, what do you do for nutrition?

[00:39:26] It's like a fucking floating trash bin fire. It's like, how did you make so many millions of dollars a year? You're so regiment on your training, your recovery, you got your massage therapist, you got, and then Christian's bro, I eat Skittles before the game and it's great.

[00:39:40] **Dr David Church:** Yeah, I've run into people that eat fast food every day that are, yeah, fast

[00:39:45] **Dr Mike T Nelson:** foods pretty common.

[00:39:46] **Dr David Church:** Yeah. Yeah. So by the way, it kind of proof isn't putting there, right? If your genetics are there and then you're training, they're doing good. Yeah. They're doing better than me arguably. Yeah. Yeah. So yeah it's amazing. I agree with you how structured some of their lives are and then you ask or like their sleep.

[00:40:02] That's the other one. Yeah. Yeah. Yeah. Yeah. They just don't sleep. They're up to one, doing whatever. And by the way, some, to be fair some are up late, but they get their sleep and they just wake up schedule. Yeah. That's I don't mess with that, but there's some where it's.

[00:40:18] I go to bed at one, but I'm up at eight every day, or I'm up at, six in the morning, every day. I'm like, I'm doing an extra hour, two, three hours of sleep, might be beneficial. So anyway, yeah, it's really interesting when you get with it's really interesting that people that make it work without everything.

[00:40:33] Kind of the stuff that we preach sometimes. It's really fascinating.

[00:40:37] **Dr Mike T Nelson:** Oh, yeah. Yeah speaking of cool studies and things that help you had a Bunch of new stuff since we last chatted and one of the ones I thought was super interesting was about looking at whey protein But adding a high amount of essential amino acids to it Do you want to run us through what you found there and what you were looking at?

[00:40:59] **Dr David Church:** Yeah,

[00:40:59] **Dr Mike T Nelson:** and always make sure you bring me back down to what matters, right? No, this is good. People like nerdy stuff. Yeah, you're the guy for the nerdy stuff, especially related to protein metabolism

[00:41:10] **Dr David Church:** Yeah, well, thank you. What I appreciate about the methods we use is, we just quantify the metabolic response So, you know if you want to talk about a no GTT and you're just measuring the glucose air into the curve We do the same thing with that, but we just do it at the muscle level and the amount of protein made So we just quantify Very on paper elegant methods, using isotope tracers, but it just allows us to calculate literally the rates of muscle protein synthesis.

[00:41:34] During a given period of time. So it's no molecular voodoo, no phosphorylation of serine 2448 on the mTOR and no, and not that none of that matters But it makes for I think it's more translatable to The lay public and so that's what we do. We just measure how much muscle what was the rate of muscle making?

[00:41:54] That was occurring in this period so The study, we took like a base product and it was a whey protein isolate. And I think it was like 24 grams. So not a maximal dose, but certainly what has been perceived to be a maximal

dose. And from previous studies, we've done a lot of these studies in these energy deficit periods.

[00:42:14] And those that are like the details we typically, These, this series of studies was done at Ethereum is a military base and they're there on barracks and well, it's not like Pennington biomedical research center where it's a true inpatient feeding model. It is, if that's the gold standard is the inpatient feeding model one a, this is in my opinion, one B.

[00:42:37] Yeah. And I'm at an academic medical center. It's pretty good here, but they, I would argue can maybe even take it a step up because they have a large, yeah. Group of registered dietitians. And they're all dedicated towards one goal of making sure warfighter health, that's the mission, and in particular, this study was done during COVID.

[00:42:56] I wondered that as I was

[00:42:57] **Dr Mike T Nelson:** reading it, I noticed some dropouts and some stuff like that. I was like, look at the timeframe. I was like, Oh

[00:43:04] **Dr David Church:** yeah. So this was done, they had their federal base. So they're operating under federal mandates during COVID. So it was border. We couldn't write it in the paper this way.

[00:43:12] And we do is we try to put in there, you always try to put in the methods, like how controlled this is. We're talking like they're giving this food, it's come back, the food's weighed. The weights are checked every day. The, like I said, food's prescribed and given to them in bags.

[00:43:26] And then, like I said, what they don't eat, then it gets weighed. So it's really rigorous science in my opinion. And particularly the study that we're going to talk about, but we noticed during these studies that on this energy deficit is that we run them in on five days and it's 30%.

[00:43:41] And that's nice because if you see some of the conversations on Twitter, you'll you there's some support that you can go up to 40%. No, it's not bad. It's science debating it. 40 percent energy deficit. You can grow muscle if you have a high protein diet and you exercise. And I'd say that's what the means tell us.

[00:44:01] Right. That's what that means. Tell us. If you look at the standard deviation of those studies, some people are actually not gaining muscle and

some are even losing some. So I like 30 percent because at that point you can see the mean, that standard deviation is staying above the zero point.

[00:44:18] So it's a nice, it's a nice value to put in there. So we ran them in like that, right? And what was nice about this study was, one, they were assigned to this whey protein plus, I think it was a traditional 20, 20, 30, I think it was an additional 30, 30 grams of essential amino acids or an additional 30 grams of carbohydrates.

[00:44:37] And they did it during caloric balance condition and then during a deficit condition. So we had to enter person. Well, this is what they'd be if they're in balance and this is, so it's really nice. But we noticed during these energy deficit studies we're doing that we were getting a lot of the amino acids we were giving were being oxidized.

[00:44:56] So not being used, the body's still using it. That's a very common misconception. You use all that protein you take in, your body will find or your body will find a use for it. In fact, you can go back to the old school nitrogen protein utilization studies, and while they may not be elegant, there's certainly nothing wrong with your methodology of, protein in and out, speaking.

[00:45:17] Whey proteins like 99 percent use only 1 percent of it gets excreted. So, yeah, it's, it body will use it, but what we were finding was a lot of it's being oxidized. In that case, it's probably being used for like central energy production or make sense. Your energy deficit, your body wants glucose once energy making substrate, the alanine and all that's going to be, so we were finding that they're being oxidized. And I should say that the person that led all this work is what should make a great guest to is Jessica. Cool. You're just there.

[00:45:47] **Dr Mike T Nelson:** Oh, cool. And what was the name? I think you cut out there a little bit. He said, Jessica. Her name Jess Gwinn, J E

[00:45:52] **Dr David Church:** S Gwinn G W I N.

[00:45:56] Her and I've worked together for six years now and we just consistently find that, you blow off blow. I'm going to say blow off because then we measure it, but you. A lot of this more of the amino acids you take during energy deficit seems to be used for energy production as compared to the studies in the literature that are balanced and we're like, Hey, if you look in the literature, if you add carbohydrates, typically you don't see an improvement muscle protein synthesis.

[00:46:18] Like post exercise periods there's some stuff about during exercise and or there's some caveats there, but generally speaking, if you're given pure glucose or pure carbohydrate, like we did in this study, you don't really see a benefit. Whole food conversation is potentially different. We don't really know that, but most of what we know about our world is.

[00:46:36] Here's a drink. Take it. But we're well, we don't really know that an energy deficit. Maybe there's this case based off this data where we're seeing a lot of this is being converted, assuming is being converted for, energy production, what we gave them carbohydrates and then to beans test this, have a, energy max groups that's getting it from just essential amino acids.

[00:46:56] Because that's, yeah. That's what's required for muscle protein, and this just would give you the greatest bang for your buck in that condition, so to speak. And between the groups, no surprising, they're in caloric balance. There's no difference between giving it energy additionally as essential amino acids or a carbohydrate, which matches the literature.

[00:47:15] But during the deficit condition, the group that got additional energy as carbohydrate had reduced muscle protein synthetic response, whereas the group that got the additional energy in the form of essential amino acids actually, it will be, it did what we call rescued that response. So, the group that got the additional energy in the form of essential amino acids had muscle protein synthetic rates comparable to the carbohydrate and essential amino acid group during caloric balance.

[00:47:41] The message there would be that it, it ended up being like. It's like I said, it's 25 grams of whey protein, another 25 grams of essential amino acids. So, the message there is that's how you would maybe rescue the post muscle protein, synthetic response, post exercise period during this sort of energy deficit, caveats there, but this work, if you're doing it for 12 weeks, don't know.

[00:48:03] I don't know why it wouldn't typically we see the body get more efficient, the longer we subject it to a stress. So I would think. I would, I'm out on a limb here, but based off the literature, it's safer than some of the limbs we've already been on, but I would be a little thicker limb.

[00:48:19] Yeah, it's a little

[00:48:20] **Dr David Church:** stronger. It might not support me. I would typically, we see that the body gets a little bit more efficient from a protein

efficient standpoint. The longer we're in these energy deficit, or even lower protein amounts. So I would be surprised if it didn't still work.

[00:48:32] That way, but there's a chance that it doesn't, but I'd be the caveat there. And then the other caveat would. Just if you did this every time over a long period of time with that equate out, but generally speaking, we do see that, it. It certainly is in kidding us that. The muscle is adapting at a greater rate.

[00:48:52] And so that was the take home message.

[00:48:58] **Dr Mike T Nelson:** Yeah. And it's super interesting because I think this is also practical for people who are looking to change body count, right? Cause what does everybody want to do? You want to maximize the amount of muscle, whether you're. physique athlete, performance athlete, just someone who wants to look good naked on the beach, want to perform better, whatever.

[00:49:14] It's the same idea. It's just different, variations of that. Do you think there's something, my little air quotes here, magical about essential amino acids? Or if you would have compared that to say 75 grams of a whey protein, because you're supplying. Enough amino acids that way do you think it's something about the kinetics or is it just the sheer volume of?

[00:49:37] Those essential amino acids getting in whether you do that via protein or an EAA supplement There could be something about the

[00:49:45] **Dr David Church:** kinetics like that's a reason for caveat Just because you're giving so much you gotta remember that The way we measure that's like a relative term, so we're putting so much into the system.

[00:49:54] So it could just be like a mass action because you're just putting so much in there. But pragmatically the essential, I don't know if there's anything magical about the essentials per se in this regard, if you gave, so if we, I think we gave, like I said, 25 extra grams of essentials.

[00:50:11] So that would be about 50 grams of whey protein. So then, like you said, if you're getting 75 grams away, I would venture to guess that yeah, you maybe get, you would be able to rescue that response. The problem there is you're getting a lot more calories, a lot more in quotes. But when you're talking about these energy deficits and the goal, right, of an energy deficit is to look this way, generally speaking it allows you to keep the cow.

[00:50:33] So I think we delivered, the point is, I think we delivered, 50 grams of protein with 300 calories. But, and that 50 grams of protein would be equivalent of 75 grams of whey. So, it's halving the calories, right? If we, I guess some of these newer ways are really efficient, but, it, yeah.

[00:50:50] I think that, that's the the magic there, so to speak.

[00:50:54] **Dr Mike T Nelson:** I think

[00:50:54] **Dr David Church:** this is a

[00:50:55] **Dr Mike T Nelson:** question of, can, do you think you can convert protein into fat? I'll just leave it at that. I have my own biased opinion on this, but I am

[00:51:10] **Dr David Church:** sure that there is some pathway in the body that Those carbons that if you trace them long enough would end up in a fat molecule.

[00:51:19] Sure, right? I in our study, I would be highly doubtful if any of that ended up as fat considering I did just actually get a little bit of a side report. We had some urine in these people and I was like, I'd be interested to see how much of it went out. I'm actually interested to see if I can account for everything that went in just based off what I have.

[00:51:41] And that would probably be, give us a reasonable estimate of like in that short period, but I really would be dubious if you're in a 30 percent energy deficit and you're taking in large amounts of protein, if any of it's getting stored as fat, if anything, the higher priority is. Is current converting that pro those amino acids into gluconeogenic precursors because yeah, it's much more fit.

[00:52:04] It's less efficient than giving glucose, but it's much more efficient to take those free for me because there's no breaking down. They don't have to be digested, right? They're already totally digested. So they enter the bloodstream right away, be much more efficient to just grab those and convert grab them for the body to uptake those and turn, take the carbon backbones of the amino acids and turn them into gluconeogenic precursors to provide, precursors to make glucose through the other pathways in the body.

[00:52:32] So I'd be more apt to say that would be the more likely route of energy production. I don't think anyone would get stool, right? Not during a 30 percent energy deficit.

[00:52:41] **Dr Mike T Nelson:** Yeah, my prediction for the next fitness trend is going to be for weight loss Ultra high protein diets and I've played around with this with myself a little bit and a couple of clients like I've gone 300 330 grams per day for like a hundred kg person and Again, anecdotally, it seems like training volume was pretty good You on paper, they were not necessarily at a caloric deficit.

[00:53:14] They were at maintenance, as best as we can calculate in the free world. They felt better and they were still losing weight. And one guy in particular, he's not public, so I won't say his name, but after his show, he was at 400 to 500 grams of protein per day. And he said he was able to maintain a much higher level of leanness and didn't feel as bad as bar his previous show.

[00:53:42] He did great. And then he's yeah, I lost my mind for two weeks and gained 25 pounds. Cause I'm like, I was just so hungry. I could not stop eating.

[00:53:54] **Dr David Church:** Yeah it's interesting. And by the way, like I'm on a, I'm on an advisory board, but I'm not paid for it for a supplement company called shifted supplement, but I have no, I don't get paid.

[00:54:04] Like for them selling supplements, so just for the viewers, so I, it's interesting that you said that because I basically, I've been drinking out of this water bottle, but I, you saw me go into this cabinet earlier, and I think, and I was looking for the essentials, I basically, I drink them all day.

[00:54:18] Cause he has

[00:54:19] **Dr Mike T Nelson:** a mix of we'll plug his shit, I don't have any disclosures with him, but. He has a mix that is essential amino acids with whey protein, correct? Yeah

[00:54:27] **Dr David Church:** Adam Gonzalez is their CSO and him and I work together to like help formulate this thing. And it's actually have it up there.

[00:54:33] It's a 10 grams of whey protein isolate and 10 grams of free form. But so I'll do that. And then I'll also do, there's some other companies like ProAmino. As a, has a really nice product. That's got 11 grams of essential. So if you want, you got to think about people don't, I don't think people can really appreciate is that 11 grams of 20, 24 grams of whey protein.

[00:54:54] And but it's, 44 calories. Yeah. It's like nothing, right? Yeah. So there's that there's amino code, there's like cage muscle. There's all these, clean

nutrition, KLE and that kind of, they have one. I'm not. I don't care where you get them from. I don't care if you even drink them, but I do find I like it.

[00:55:12] I drink it all throughout the day, and I, I don't know, I find it pretty interesting because of some of the I started this year, and just some of the Like how I've been feeling like everything you mentioned with your client I've noticed some of those things to where at the beginning of the year, for some reason, I started drinking them all the time instead of water.

[00:55:28] I still drink water but like in the office, I'll just take a scoop and I just, I drink it in a big cup and I just drink it throughout the day. And yeah, it's been, and I'm not the only one, there's a, I had a buddy the other day that was like, yeah my, my spouse looked at me and was like, you've lost weight.

[00:55:43] And I'm like no no, really. And he's well, I just drank caffeine and essential amino acids for two o'clock, and so it's and there's, I don't think there's anything special about the essentials there, but like the point I'm trying to make people is it can artificially increase your protein intake, right?

[00:55:55] Because they are what causes. The muscle needs those to grow, doesn't need the non essentials, and if you're eating like a normal diet, you're gonna get the amount of non essentials you need. So it's like a really nice way to increase your amino acid caloric intake. And so I, that might be where some of the, that's the only magic with the EAAs is that they're just really easy.

[00:56:17] A high bang for your buck from a caloric standpoint, and so it's everything you're talking about, these ultra high protein diets, maybe that's like when we've done studies where we've given people 45 grams of essentials a day, which, that would be on about 90 grams of whey protein.

[00:56:32] You're probably doubling or tripling artificially their protein intake. And maybe that's why we're seeing some of these results. We've seen studies of like, even in the absence of exercise, they're getting increasingly. So it's just, I point is, yeah, I think you're right. The data a roundabout way backs it up.

[00:56:49] I'll see if we can do some pilot testing here about how much protein can eat in a day and how anabolic can you get, maybe we can get that answer.

[00:56:57] **Dr Mike T Nelson:** Yeah. Cause I honestly, the more you look at, obviously calories are going to matter. And if people want to maximize muscle gain. Yes, you need to be in a caloric surplus.

[00:57:06] I don't think anyone's going to argue with that, but I think the question then is, if your goal is body composition or recomposition, what is the most Efficient way you can do that where you're maintaining as much muscle as possible and your compliance is Decent where you don't feel like you have to white knuckle your way through every single day

[00:57:28] **Dr David Church:** Yeah, and so a good example of that is like I said that one company from they have the 11 gram product.

[00:57:34] It's 44 44 calories, right? So, most, I believe most weight proteins nowadays, 20 gram servings like gives you 120 calories, plus or minus, I know, I think gonzo is or something. But, um, so now you can take three of those servings, so that essential amino acid and get 33 grams of aminos which would be equivalent to about 60 some grams away for the same calories.

[00:57:57] So, you're only getting a third of the way for the same amount of calories. So I think that's just where it's not magical, it's just basic math. And, to your point, like you're still eating all your other foods. So you still have you're not like, you can get all your nonessential.

[00:58:14] You can get all the non essential oils you need from your food. And if you want to, whey protein, take whey protein. I take, I make a thing most nights of milk with milk, right? I don't care what you do. You don't have to take the ACE. I just, if there's any magic, that's what it is.

[00:58:27] It can be expensive to be fair. But I think there is, they used to, I feel like they used to be more expensive. And I think they're starting

[00:58:33] **Dr Mike T Nelson:** to come down. They've actually come down in price. Whey protein has gone up. Essential amino acids have come down. And. There's some new versions that are, I wouldn't say they're the most amazing tasting thing, but they're not bad.

[00:58:45] I remember ordering them back four or five years ago, unflavored, just to play around with it. And I opened the container and I smelled it and I'm like, cat piss. That's exactly what it smells like. Yeah. No, tell I did a mix worth of shit. . Yeah. I I have Gonzales's product there. Like I said, it's half and it's man, tropical mango.

[00:59:08] **Dr David Church:** It's pretty good. . There's a little whatever, but then this other perino company had raspberry and orange. I just tried raspberry

the other day. I thought it was pretty good. Like you could have told me it was crystal light. I wouldn't believe you. So , yeah, the new

[00:59:20] **Dr Mike T Nelson:** ones are very passable.

[00:59:21] **Dr David Church:** Yeah, and what people don't think can maybe appreciate, everyone's very willing to play around with whey protein recipes, but once you get into the flavors, like you're opening up a whole world of realm of possibility.

[00:59:30] Like I can, I make I think maybe I've said it on this podcast before, but I took it from Ricky Keene. She did this down when she's in Orlando and she's working for Orlando City Soccer. But it's so hot down there. They don't really want whey protein after their drinks. So she was using BCA popsicles just to get something in.

[00:59:45] **Dr Mike T Nelson:** Oh yeah.

[00:59:46] **Dr David Church:** Now you can do it with the EAs. Now there's a lot more EA products. So you can do like essential amino acid popsicles. So it's, they're pretty good, so, a lot of like ways to play around with it and build it into your day. And I feel like you're, like missing out because you're trying to like lose weight.

[01:00:02] **Dr Mike T Nelson:** You're saying, yeah there's even a waiver version. That's what is it? The clear beverage, I think and I've had some samples run of that. Cause I was going to release it as a product. And I just tried it with people who hate because waste still has that milk aftertaste to it. And everyone I tested it with, they're like.

[01:00:19] This isn't whey protein. I was like, no, it is it was like 20 grams and it was amazing, but I'm not at the point where I could drop what they wanted for a minimum run. So I'm trying to convince someone else to do it. Cause I think it's, and there are a couple of products that do use it on the market, but they're even more expensive than whey, which is the downside.

[01:00:37] **Dr David Church:** Yeah. There's like the native way too, right? Yep. That's another one. Yeah. That's an interesting product. I think there's like a, I forget the name of the company. I know the parent company is lactillus, but that's like a huge. That's a huge dairy. I think it's like the second largest dairy producer in the world.

[01:00:53] But they have, they have this some sort of subsidiary that's selling like a native whey product. And it's really interesting because it's 19 grams, to your point, it's 19 grams of product but it's 17 grams of protein. Yeah, I was like, this is gonna taste terrible, because even like just unflavored way has that kind of like musty the kind of whatever and so I tried it and yeah, I was totally surprised I was like that's it's like tasteless as I've I think you can get yeah So like you can start really hiding that stuff if you want to, so it's just, it's compared to going back to how this started, this all started going back to our early days.

[01:01:28] You know what I mean? Back in the day, like the ability to play around with the different products nowadays, you have pop tarts. They're expensive, but you can go buy those pop tarts at Walmart, so it's just amazing. The high protein ones from legendary foods. Yeah. Yeah.

[01:01:42] Whatever they are. I don't ever get them. Cause it was like, I'm gonna do a pop tart. I'm just going to do a pop tart. That's what I do. Yeah. I'll take some, my essentials, yeah. I'm pop tart in a way.

[01:01:51] **Dr Mike T Nelson:** That used to be my pre training in college.

[01:01:55] **Dr David Church:** And so, yeah, but there's a lot of ways to play around with that.

[01:01:58] And I, that's, I just look at the essentials as another tool in the toolbox. It's so cliché, but. It is. And by the way, there's, it's easy on the gut, so it's great if you got someone that's got like a multi-event during the day and you're just trying to get some easy nutrition in 'em, some of these, certainly some of these like clear way seem to sit pretty good on the gut too, but the essentials, there's nothing Yeah. It's super easy. Yeah. So I just think that it's just another tool and is the context of what you need. If you're someone that, I'm not here to pimp any products, so if you're someone that.

[01:02:28] You don't care, you're not, you don't need to be in a clerk deficit. Then yeah just take whatever way protein you want. So another area that they're great for is like that pro amino product I'm pretty sure is actually plant based.

[01:02:39] Oh,

[01:02:39] **Dr David Church:** interesting. Yeah. It's 11 grams of crystalline amino acids, essential amino acids that just come from plant sources.

[01:02:46] So it's the, that is going to be by far the most anabolic plant based. Oh, yeah, I think that's another area that like. It could certainly be a very useful tool if you're plant based and vegan. I think you're probably better off going with the free form essential amino acid products than most of these soy, these plant blends, just my opinion.

[01:03:12] **Dr Mike T Nelson:** Yeah, and if I work with any vegan athletes, which I have, my first question is, are you willing to use supplements? And if they're like, yes, it's pretty easy, right? If they're like, no, I must do this all from real food. Yeah, you can definitely still do it. There's ways around it. It's just are you going to spend the time to do it?

[01:03:29] Right? And so that's my next question is, okay, how much time do you want to dedicate to this process? We can definitely come up with stuff that'll be helpful. It'll work, but unless you've got someone preparing all this shit for you, it's going to be more time just preparing and eating and everything else.

[01:03:44] If you're willing to do that, then cool. Like you're good. But if you're telling me you don't want to do that either, then. I got no magic for you, man.

[01:03:51] **Dr David Church:** Yeah, it's like the carnivores too. It's the same thing. Yeah, same idea. Will you put a little bit of a lime on top of your steak? If not then we're gonna need a vitamin c supplement here.

[01:04:00] We're not gonna, you're not gonna get scurvy and rickets on me, so, yeah, I'm with you. I think, it certainly got easier with the with these essential amino acid products and the creatine, like creatine and stuff nowadays if you want to go vegan yeah, just if you're willing to take in that's the plant based source, like that's gonna be way better than even a soy protein isolate, if you look at the data on soy protein isolate, even 40 grams doesn't really increase the the muscle protein synthetic response. And I think stew, and I think the lead author on it's Wilkinson. It could be Sarah Wilkinson has one of those papers from back in the day where they did like soy versus milk and the milk was, end up being significantly greater for 12 weeks.

[01:04:39] Yeah. I know there's some newer stuff coming out showing that, plant based. Vegan diet versus omnivorous diet, which is just as good from a lean mass perspective. But if you look at the I think you had Paul Morgan on before. Yeah, we did. Yeah. Yeah. Yeah. We'll link to that episode.

[01:04:50] He's great. He's great on that. But, you look at that study, I think the omnivores, doing two or three weeks, two or three days of training per week for

12 weeks ended up having they had a their leg press 1RM increased by 25 kilograms more than the plant based group.

[01:05:03] So, and, the plant based group got brought up to high protein by taking in 50 grams

[01:05:08] of

[01:05:09] **Dr David Church:** soy. So now, you got a good chunk of your calories, and I got nothing in soy, but it's just like you got a good chunk of your calories and everything coming from soy. And there's nothing wrong with having soy in your diet.

[01:05:20] There's certainly been plenty of health benefits to it. Like you need 50 grams of the soy protein I put every day versus like maybe just taking two, two of this plant based essential amino acid drink. Right. And now you've cut out a lot of calories and only cost you 90 to 100 calories to do this drink twice a day.

[01:05:38] And now you can free up all those other calories for actual whole foods, so I think that's another area like context, right? Like all these little different niche ways to use it. Once again, I got nothing in soy, I've consulted for them before, I think it's, I think It's the best plant based protein there is, but I think you'd be better off just eating some edamame, and taking the like essential amino acid product if you're willing to do that, and if you're not, like to your point, if you eat something that's not, then yeah, by all means, if you do a protein isolate, that's going to be your next best bet.

[01:06:10] **Dr Mike T Nelson:** Yeah. Last two questions of the EA's and we'll ask you about the Impossible Burger Study as we wrap up. Would you agree that a minimum dose for EAAs is probably around six grams and then the second question Is there any benefit to including it with a carbohydrate source during longer lifting sessions?

[01:06:30] If you're going to lift for longer than like an hour, is there any benefit to consuming EAAs during the lifting process? Or, hey, if you get some protein a couple hours before and after lifting, and your total protein is high enough don't worry about it.

[01:06:45] **Dr David Church:** Well, your 1st point, yeah, I'd say 5 grams is, I have a product that each serving is like 3.

[01:06:53] 6 grams because there is evidence to show that 3.6 grams of essentials increase. The muscle protein synthetic rate above, resting about baseline. Yeah. Yeah. Yeah. The data on seven and a half is a little stronger in my opinion. So I always do two scoops I do that. Yeah, so I think that seems that I think two scoops is reasonable.

[01:07:12] 11 I think is going to give you a maximal response, whatever that means. I know everyone's seen the Tremellin study, but yeah, our lab has been writing since 2012 that there's no upper limit, so we don't. That's a weird word. Yeah. I'm glad that Jorn showed it in the way he did. Oh yeah. I saw that came out and I was like, yeah, I'm totally in agreement.

[01:07:36] We've never really thought there was an upper limit. Just because if you go, if you look at less elegant methods, you earned it in a very elegant way. It's a very nice method. Yeah. It's, but if you look at less elegant methods, it lines up very nicely with the data. So, but I'd say like that 11 to 15 gram dose somewhere in there, that's probably like a maximal.

[01:07:57] Those, but then, you're in study or they did 100 grams of milk protein. That's a good chunk of essentials. There are at least 45, 40, 45 and then the study that we just did where we gave basically, I suppose at 24 grams away and then 24 or 30 grams of the essentials.

[01:08:11] So you're getting 30, 40 grams of essentials there, so, I'm just trying to say the, when I say maximal, that's an arbitrary thing, but yeah,

[01:08:19] **Dr Mike T Nelson:** it's based on what you've actually looked at and what the context is, and it's not a linear response. It's going to go up and it's going to start to flatten out and we'll want how long is the incorporation, right?

[01:08:28] How long are you looking at? How many

[01:08:29] **Dr David Church:** hours later? Yeah. And so, yeah, I think, somewhere between seven and a half and 15 grams is a reasonable, single therapy, because after that, it does get a bit to be pretty expensive, it's all relative to the second part was about adding carbohydrates and essentials and do a workout.

[01:08:50] And there's actually some pretty good data from, I think it's, Oh, it's one of the Scandinavian countries. I was like

[01:08:58] bloomstrand back when

[01:08:58] **Dr David Church:** they were doing a lot of the work where they would look at adding the BCAs and during these time trials and stuff and trying to get like a better, central dopamine uptake and things like that.

[01:09:09] That would be maybe the benefit there where you're just improving like dopaminergic drive

[01:09:13] **Dr Mike T Nelson:** and the central fatigue hypothesis, which Depending on the day of the week, I go back and forth on that. Right now I'm I don't think so is where I'm at, but I'm willing to be wrong.

[01:09:24] **Dr David Church:** I don't even want to say fatigue in the context of how we're talking about, we're talking about training sessions.

[01:09:29] Realistically, you're not gonna get as fatigued as like those cycling, isn't true. Yes. Cycling studies. Yeah. They're punishing people for hours. Yeah. They're doing time of exhaustion stuff. But when you're talking, you and I like going in and having a workout. Like I would say maybe like you might just be increasing that dopaminergic drive, that M1 activation, improving the drive to the muscle, and that might be why I know there's a study back in the day, if you look at like the protein timing stuff, there seems to be a difference pre and post. That's also like a, a different caveat there. But if you look at, there's some earlier studies where if you, where they're doing just the crystalline essential.

[01:10:03] They were finding like better results if they took it before and after workout instead of just after. But, that's kind of cherry picking the data. It'd be, I think it's, I think that's one of those things where if it works for you and you feel it gives you a better workout, then by all means like I know I like to take it, right?

[01:10:19] Do cardio.

[01:10:20] Because it

[01:10:21] **Dr David Church:** seems like it just. Seems like I enjoy it better and I do feel a little bit more especially in the morning if I didn't get anything to eat And just because I'm rushing around I've had my caffeine put some of the essentials in the system And I do feel like I get a the movement quality feels better.

[01:10:38] It's just totally subjective. But yeah Well, there's certainly up for there's certainly a scientific rationale for why they might help but I don't know if it has much to do with sort of strong metabolic underpinning.

[01:10:51] **Dr Mike T Nelson:** Yeah, cool. And we got about eight minutes left if you got time do you want to talk about your recent studies just published about the our friend the impossible burger again?

[01:11:01] **Dr David Church:** Yeah, I just look once again. I have no problem with soy. That's how I just give you a bad time I have no issue with soy. I just like by the way, like Again, we show this. If you take more, you can get the same response as you get with an animal protein, like whether it's whey or beef, in this case it was beef, that's well documented.

[01:11:22] You just have to consider that to take more, you need more calories. That's just facts. I've got no problem with soy. And so it's an interesting study because we did four ounces of beef and four ounces of burger. And people are like, well, why didn't you protein match it? Well, when I wrote the grant three years ago they were protein match because impossible says that it's matched exactly for 80, 20 beef.

[01:11:42] And if you go to the USDA database, that's 19 grams of protein, the impossible burger. Reports, 19 grams of protein. So boom. And I thought, Hey, everything we've seen shows you need more from soy. We're going to get hammered by the time this gets published because we don't have a group that is ISO EA because the soy has lower EA content than beef.

[01:12:03] And so I said, let's do a group that gets 8 ounces of soy of impossible burger, because then. I was like, now we got this 19, 19 gram comparison. Then we got this 38 gram comparison and most of it's soy protein concentrate. And it's not an exact ISO EA match with the eight ounce of impossible versus four ounces of beef, but.

[01:12:22] It's close. And if anything, the impossible burger has slightly more, which is better because now you're not, favoring beef and trying to make beef. I know that was a cool setup. I liked the setup. I thought it was actually good. Yeah. Well, when I go to write the paper, finally some independent data comes out from this, an academic group.

[01:12:40] And by the way, there's nothing wrong with that USDA data. We could have gone, right. That data is probably just as good. It was the best you had at that point too. Yeah. Yeah. And the impossible burger date is probably

good too. The USDA database is very strong. I don't think there's any data. We just well, we can't say we're going to take the USDA database and then take the data from finale out of Stein's group.

[01:13:01] But impossible burger, we're like, let's just take the data from the same source by the same people, by an academic third party institution and just report what they measured. And so we've got slightly different amounts of protein from that regard, but it's still very pragmatic because that's how people eat.

[01:13:15] And even with the different data, the eight ounce group had more protein, had more essentials. It actually had more essentials than impossible was. Reporting based off finale. So in that case, it actually was, we made it stronger in a way, and it had more calories. And then

[01:13:31] the, and the four ounces of impossible burger had less calories, a little bit less protein and less essential amino acids.

[01:13:40] And anyway, long story short, um, what I found surprising was one was that the plasma central amino acid, beef gave a greater response, which didn't surprise me. But what surprised me was that the eight ounce impossible burger group. Never had an essential amino acids that were like higher they got there's a time point very late in the Period where they got just the size of the process of beef, but beef was already on the way back down So

[01:14:06] **Dr Mike T Nelson:** that was surprising.

[01:14:06] That was surprising to me, right? So yeah, there's something in the impossible burger that's not allowing the plasma levels of EAAs Even though they had more raw material to start

[01:14:16] **Dr David Church:** Yeah, step one is, it's well documented that soy has a greater splanchnic extraction than like whey and milk, and probably beef, some's getting shipped off somewhere else. Yeah, it's getting taken up by the gut by a greater extent, that's well documented, particularly compared to like milk proteins. Now it has been compared to beef, but that's the best I got. But there might be a chance that some of the binders they're using or something that it's just not allowing, it's making it harder for the gut enzymes to get access to it, to get it out there as quickly.

[01:14:44] But regardless, what we saw was that the 4 ounce Impossible Burger gave no increase in muscle proteins at all, whereas the beef gave a significant

increase above basal values. And that the eight ounce group gave a significant increase above basal values. And that the the statistically the beef burger was statistically different than the four ounce group of impossible burger.

[01:15:06] But not the eight ounce group of the impossible burger. But interestingly the eight ounce impossible burger was not significantly different from four ounces of impossible or ounces of beef.

[01:15:15] And I don't know, in this

[01:15:16] **Dr David Church:** case, statistical significance, I wouldn't. Yeah, it's important. If you look at the data, I would say.

[01:15:23] My take home message is that it took eight ounces of the impossible burger to get the same response That was my take home just as a reader of it. That's a side. I know, You know, the main statistical find me if you look at the data, right? The beef and the double possible burger here and the singles down.

[01:15:38] So, that's what the stats say. And we did get statistical significance with the beef being greater than the 4 ounces of impossible, but the 8 ounce group not being significant for the process tells you, you just, you need to take to those impossible burgers to get the same involved response, both at the muscle and.

[01:15:54] The whole body level the whole body protein synthesis values it mirrored the muscle, which was a nice, that's intrinsically satisfying as a tracer

[01:16:00] for

[01:16:02] **Dr David Church:** those that have any interest in tracer methodology, that was happy to see. So, yeah, that's the take home from it. I think, seems to be, people seem to like it on both sides, I have, it's been very civil discussion, no one's been no one's really gotten hurt about it.

[01:16:16] anything like that. So it's actually been the postdocs and I were joking. That seems like we may, we're bringing the beef and the soy camps together a little bit on at least one study. So yeah, it's, it was a nice study to get done. It is, it was a nice pragmatic feeding study that had a kind of nice muscle protein synthetic response to it.

[01:16:33] Yeah. I thought it was neat. And the biggest thing that I was happy about was we saw, we got to repeat a finding I found early in my postdoc was

that the maximal level of plasma essential amino acids correlate the change in muscle protein Seems like getting those out there quickly is what's, or getting a high level factors is important for driving the response.

[01:16:55] Yeah. Cool. Yeah. I don't know if that's enough of a summary, but I was trying to, I know you got to work out here soon, but

[01:17:03] **Dr Mike T Nelson:** no, that's perfect. Yeah. Well, thank you so much for all your time. And where can people find you if you want to be found? And then do you guys are looking for any grad students or anything there?

[01:17:13] If people are interested in this field?

[01:17:15] **Dr David Church:** Yeah, at the moment we're not we just got two postdocs on and and a new master student as well, pretty tapped out. But. That doesn't mean you can't send an email. We're always writing grants and trying to get more funding. And if more funding comes in, we take on more people.

[01:17:29] So it doesn't mean don't send me an email. You can always email and ask. And the nice thing, and I think you would back this up is even if I'm not taking someone, I might know someone who is definitely, yeah, rather small community. Yeah, it's just, yeah, the protein metabolism crew is not, it's not large as for finding, Instagram and Twitter at Dr.

[01:17:47] Mylehead might be the most salient ones for your audience, but you know, DMs are usually open as long as you're nice to me. That's always the joke. Don't be mean. He

[01:17:57] **Dr Mike T Nelson:** still answers mine, even though once in

[01:17:58] **Dr David Church:** a while. Very helpful. I appreciate it. Yeah, I know. So, always want to get, and I've gotten better about using Instagram too.

[01:18:05] So I'm much more active on there than I used to be for better or worse. Yeah, those are probably the best places.

[01:18:11] **Dr Mike T Nelson:** Cool. Awesome. Well, thank you so much. Really appreciate all your time. Yeah. I always

[01:18:16] **Dr David Church:** enjoy

[01:18:16] **Dr Mike T Nelson:** talking with you.

[01:18:17] **Dr David Church:** It

[01:18:17] **Dr Mike T Nelson:** was a great time.

[01:18:18] **Dr David Church:** Thank you.

[01:18:20]

[01:18:21] **Dr Mike T Nelson:** Thank you so much for listening to the podcast. Really appreciate it. I thank you so much to Dr. David Church for being on the podcast. And once again, we will link to his other episode also. So make sure to check that out.

[01:18:37] Make sure to check him out on social media for all the great stuff he's got going out related to science of all things anabolic. And Tecton, if you're looking for exogenous ketones, they're my favorite. Granted, I am a scientific advisor to them and an affiliate. Thank you so much for listening to the podcast.

[01:18:57] Really appreciate it. If you can give us the old stars and even a short review that goes a long way to help us with the algorithms. And if you know someone who may enjoy this episode, please forward it to them, share it on social media. Thank you so much. I really appreciate it. Have a wonderful day.

[01:19:15] That was wonderful! Bravo! How was great! Well, it was pretty good. Well, it wasn't bad. Well, there were parts of it that weren't very good, though. It could have been a lot better. I didn't really like it. It was pretty terrible. It was bad! It was awful! It was terrible! Get him away from me!

[01:19:29]

[01:19:29] **Dr Mike T Nelson:** This podcast is for informational purposes only. The podcast is not intended as a substitute for professional medical advice, diagnosis, or treatment. You should not use the information on the podcast for diagnosing or treating a health problem or disease or prescribing any medication or other treatment.

[01:19:47] Always seek the advice of your physician or other qualified health provider before taking any medication. Or nutritional supplement. And with any questions you may have regarding a medical condition, never disregard professional medical advice or delay in seeking it because of something you

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